

VOCALIZATIONS OF THE MOUNTAIN PLOVER

WALTER D. GRAUL

The Mountain Plover (*Charadrius [Eupoda] montanus*) is a little-studied endemic species of western North America, breeding on the shortgrass plains mainly east of the Rocky Mountains and wintering from California and Texas to northern Mexico. Apart from a few anecdotal reports, information on the breeding biology of the species has come from a single study (Laun, 1957). In 1969, I began a study of the Mountain Plover on its breeding grounds in Colorado. The present paper describes the vocalizations of the species, which to date have been among the most meagerly reported (e.g. Bent, 1929) of any North American plover. Other aspects of the behavior of this species have been published elsewhere (Graul, 1973a, 1973b) or are in preparation.

Formerly, this species was placed in such genera as *Podascys* or *Eupoda*, but recent workers such as Bock (1958) and Jehl (1968) consider the species to be in the genus *Charadrius*, an opinion with which the A.O.U. (Eisenmann et al., 1973) now agrees.

STUDY AREA AND METHODS

I studied these plovers on two study areas in northern Weld County, northeastern Colorado. The major areas consisted of 16 km² just southwest of Keota. The secondary area was on the International Biological Program's Pawnee Site, approximately 64 km northwest of Keota. I spent the following periods on the study areas: 18 March–15 August 1969; 25 May–29 May 1970; 1 June–31 July 1971; 31 March–19 May 1972.

Vocalizations were recorded with a Uher 4000 Report-L tape recorder and Uher A-13 microphone (with parabola for two calls) at a tape speed of 7½ inches per second. Audiospectrograms were prepared with a Kay Electric Company Sonograph using a wide band-pass filter.

RESULTS

To the human ear the vocal repertoire of the adult Mountain Plover seems to consist of several distinct calls. During my work on this species, I obtained limited recordings of most of these calls. These vocalizations are described mainly qualitatively, and additional research is needed to quantitatively describe any variability in them.

Wee-wee Call.—This call (Fig. 1A) consists of a single note repeated rapidly in series. It is given by both sexes on the ground and in an aerial display (Graul, 1973b). The call is also frequently uttered by birds during aggressive encounters. Although commonly given during the prenesting and early nesting periods, the call is rarely heard once nesting is in full progress. On one occasion, a male attending a brood suddenly stopped injury-feigning and gave this call. Sometimes several members of a fall flock utter the call si-

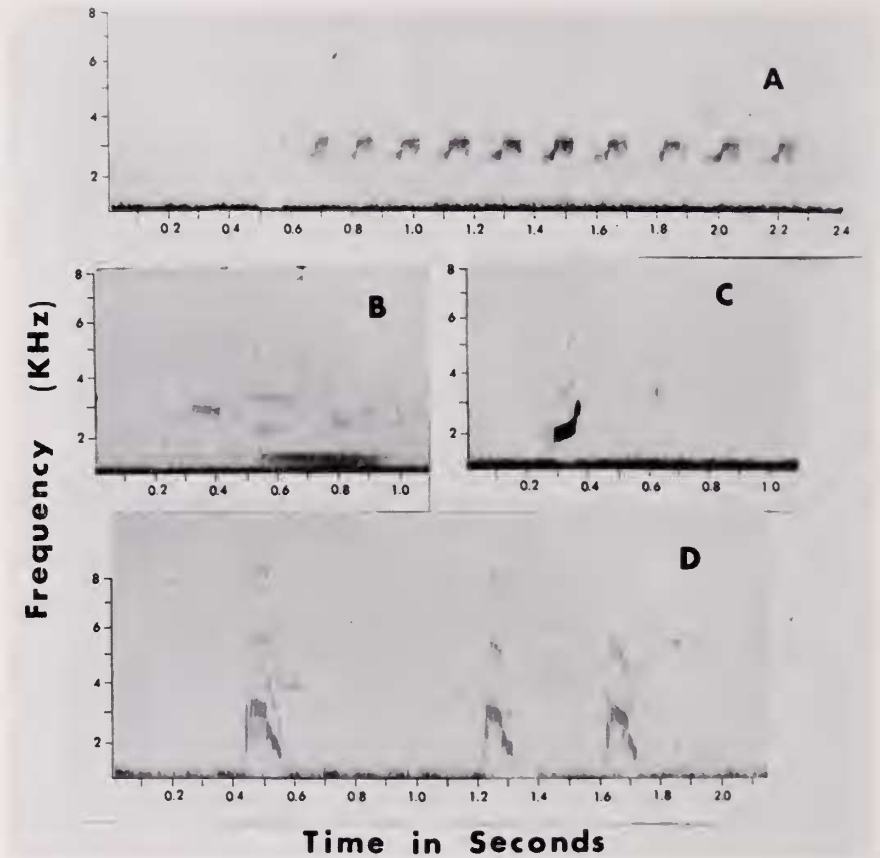


FIG. 1. Audiospectrograms of Mountain Plover calls: A, Wee-wee; B, Mooing (low vocalization at 0.5-0.9 sec.); C, Tu-lup (at 0.3 sec.); D, Ke-op.

multaneously. The calls recorded by me have a frequency between 2.5 to 3.5 KHz, with a fundamental frequency of about 3.0 KHz. The calls are about 0.1 sec in duration, with the interval between calls about the same. I detected no harmonics on my audiospectrograms.

Mooing Call.—This call is given during Bowing, a major courtship display (Graul, 1973b). It is a low, soft sound (Fig. 1B), strikingly similar to a cow mooing in the distance. The display and call are usually given by males, but I did record one female giving them in response to Bowing by a male. The calls have a frequency between 0.0 to 1.0 KHz, and I detected no harmonics on my audiospectrograms. The calls are about 0.4 sec in duration, with the interval between calls about the same.

Chert Call.—This call consists of a short, soft note repeated in series; it is given by a male, in the Upright Precopulatory Posture (Graul, 1973b), as he approaches a female prior to mounting. I was unable to record the call, as males terminated calling as I approached them.

Tu-lup Call.—Frequently, an adult attending a nest or its brood initially responded with this call (Fig. 1C). It was typically given by a bird as it stood in an alert posture, repeatedly flicking its head back while keeping its bill parallel to the ground. This is an anxiety movement typical of many species of Charadrii (Maclean, 1967). The calls recorded by me have a frequency between 1.0 to 3.5 KHz and consist of a two-part unit, with the second part at a higher frequency than the first. The calls are about 0.1 sec in duration, but I lack data on the interval between calls. There are two very weakly developed harmonic bands.

Ke-op Call.—This call was given in the same context as the preceding call. On some occasions one or the other was given alone, but frequently the two calls were mixed in a single series. This call (Fig. 1D), as in the Tu-lup Call, is a two-part unit, but the frequency drops in the second part and has a range of about 1.0 to 3.5 KHz. The calls are about 0.1 sec in duration, with the interval between them varying between about 0.3 to 0.7 sec. Weakly developed harmonic elements are present.

Kip Call.—This is a short note produced in rapid series, but I was unable to record it. Occasionally, when I released a captured bird it would fly away giving this call. Frequently, when one bird chased another in the air the call was given, but I could not ascertain which bird did the calling.

Clicking Call.—Three adults responded with this call as an observer crouched beside their respective nests. The call is a barely audible, mechanical sounding note (Fig. 2A); it is produced in irregular bursts as the bird moves slowly, in the Tail-down Rush Posture (Graul, 1973b), towards the intruder. A given note sounds like a single unit to the human ear, but it appears from my audiospectrograms that each note is actually composed of two parts. The first part has a frequency between about 1.0 to 4.5 KHz and the second part has a frequency range between about 2.0 to 3.0 KHz. Each note has a duration of about 0.02 sec and the interval between notes within a single burst ranges from about 0.02 to 0.03 sec. I detected no harmonics on my audiospectrograms.

Chatter Call.—This call was given immediately following the preceding call by the above three birds. It was uttered as a bird suddenly moved quickly toward the intruder; it is a series of loud, harsh notes (Fig. 2B). The calls recorded by me have a frequency between 3.0 to 4.0 KHz. They range from

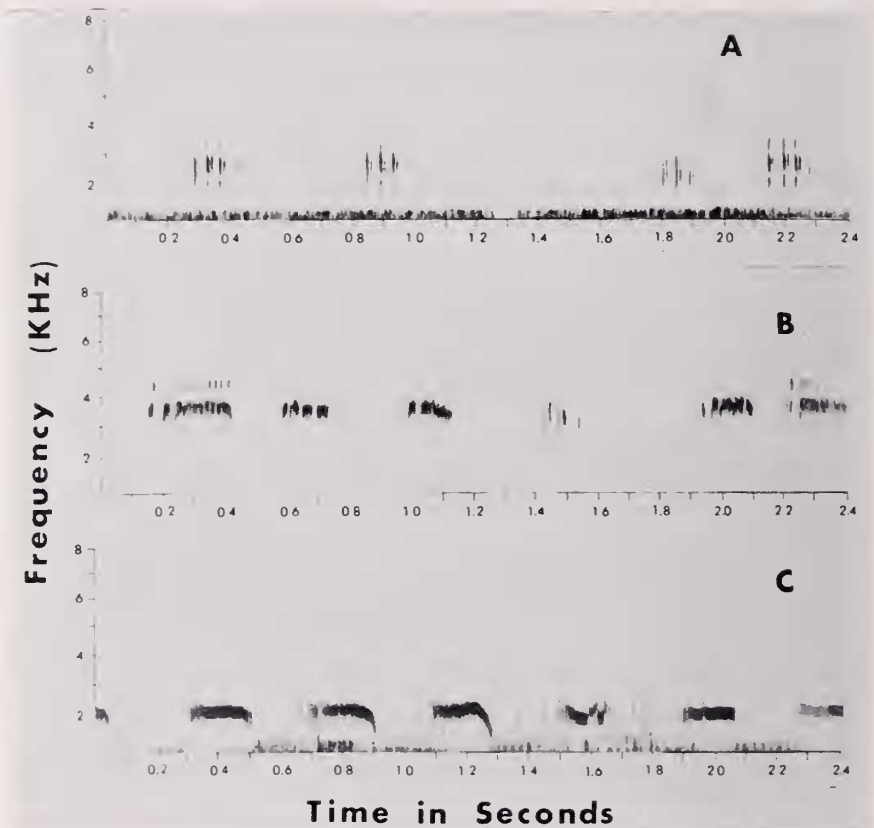


FIG. 2. Audiospectrograms of Mountain Plover calls: A, Click; B, Chatter; C, Squeal.

about 0.2 to 0.3 sec in duration, and the interval between them ranges from 0.1 to 0.4 sec. A harmonic band is present between 4.0 to 5.0 KHz on some of the calls.

Squeal Call.—Frequently when I approached a nest or brood, the attending adult would perform intense injury-feigning displays: sometimes these displays were accompanied by this call (Fig. 2C). The call is a prolonged series of notes which, both in terms of frequency and tempo, remind me of the distress squeals produced by a cottontail rabbit (*Sylvilagus floridanus*) on a commercial predator-calling record. The notes recorded by me show much variability, with a frequency between 1.0 to 2.5 KHz. Some notes are at a constant frequency, but others terminate with a definite drop in frequency. The duration between notes ranges from 0.15 to 0.2 sec. Weakly-developed harmonic elements are present.

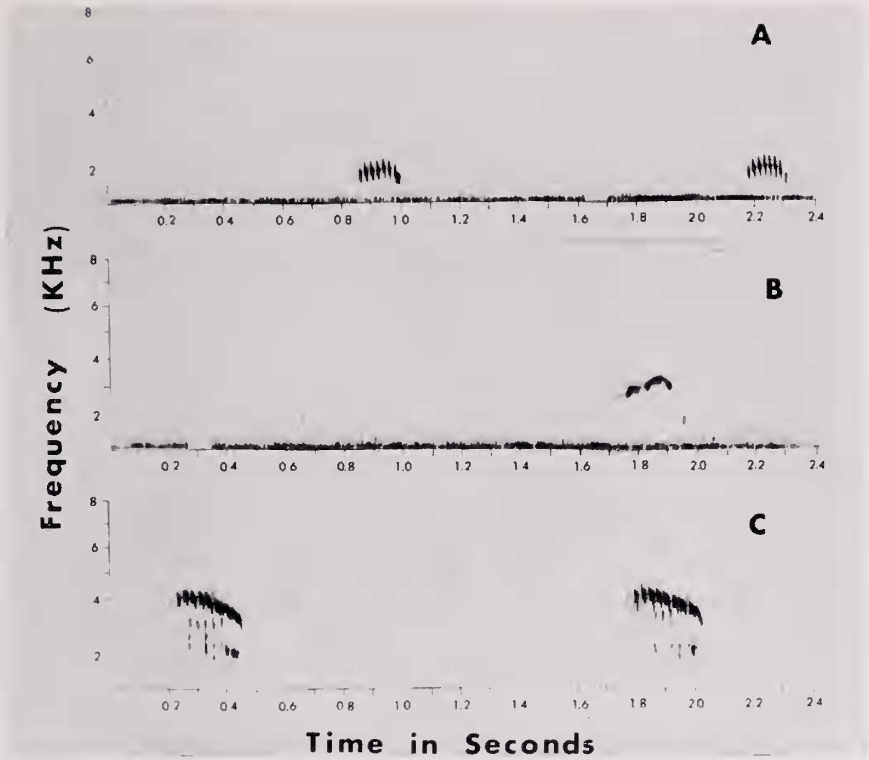


FIG. 3. Audiospectrograms of Mountain Plover calls: A, Brood; B, Peeping; C, Chick.

Brood Call.—On three occasions, by placing a microphone near a brood, I was able to record a low, guttural call (Fig. 3A) uttered by an adult as the chicks moved under it to be brooded. Although I could see the adult's throat moving as it called, I never heard the call. On one of these occasions I was within 25 m of the adult. The calls recorded by me have a frequency between 1.0 to 2.5 KHz. The duration of a call is about 0.15 sec, and the interval between calls is about 1.2 sec. I detected no harmonics on my audiospectrograms.

Peeping "Call".—Peeping sounds (Fig. 3B) could be heard in eggs up to three days prior to hatching, although they may not represent vocalizations. These sounds are quite different from the calls of newly hatched chicks. The peeping has a frequency between 2.5 to 3.5 KHz, with a fundamental frequency at about 3.0 KHz. The duration of a peep is about 0.2 sec, but I lack data on the interval between peeps. I detected no harmonics on my audiospectrograms.

Chick Call.—When held, newly hatched chicks would usually utter a rather loud call (Fig. 3C). Upon hearing this call the attending adult frequently responded by coming closer to me. The calls have a frequency between 2.0 to 4.5 KHz, with a fundamental frequency at about 4.0 KHz. The duration of a call is about 0.3 sec. I only have one continuous recording containing two calls, and the interval between the two calls is about 1.3 sec. I detected no harmonics on my audiospectrograms.

Although the above are the only calls that I have heard or recorded, I suspect that future study will show that some of these calls are given in other contexts or additional calls exist. For instance, when a male mounts a female prior to coition, his throat moves constantly, and he may be uttering sounds.

DISCUSSION

The Mountain Plover has been known to science since 1837, when it was first described by Townsend—interestingly enough—as *Charadrius montanus*. Perhaps the earliest report on the species' vocalizations was that of Elliot Coues (1874); in fact, his account has been among the most frequently cited of any in the intervening hundred years (e.g. Dawson, 1923; Bent, 1929). Subsequent authors have added bits and pieces to the vocal record of the species, and I would like to attempt to relate the published record to what I have found. In addition, I shall discuss function and other aspects of the vocalizations of the Mountain Plover.

Speaking of wintering flocks of these plovers near Los Angeles, California, Coues (op. cit.) says that "their notes are rather peculiar, as compared with those of our other plovers, according to circumstances." He goes on to describe "a low and rather pleasing whistle, though in a somewhat drawling or rather lisping tone," as being given by feeding birds considered by him to be undisturbed. Going on, he states that his "note changes to a louder and higher one, sometimes sounding harshly," but he does not mention the context surrounding the change. Conceivably, these could be the Tu-lup and Ke-op Calls recorded by me, and which I regard as alarm notes. Coues may also have been referring to the Kip Call, which I suspect is an additional alarm note, perhaps confined to flushing birds or those in flight.

Palmer (1967) has referred to chattering calls as given by this species, especially at the nest. These calls would appear to be one or both of the aggressive notes that I recorded, i.e. the Clicking and Chatter Calls. Perhaps these notes are restricted to birds at nests, but they may be used in other contexts as well. From my observations, the Clicking Call is low intensity and the Chatter Call is high intensity aggression.

Also aggressive in tendency is the Wee-wee Call, which I found used in

hostile and in territorial advertisement displays. This call is the most frequently heard during the prenesting and early nesting periods; in fact, if a Mountain Plover is heard calling in the distance, the Wee-wee Call is usually the call being given. This call is also used by birds in fall flocks, and there it probably also reflects hostile interactions; birds still maintain their individual distances in these flocks, and aggressive displays are sometimes given. There are two literature descriptions of vocalizations of this species that I would consider to be in reference to this call. Donald G. Davis, in Bailey and Niedrach (1965), reports hearing "a spring song—usually given from the wing—which I have never seen described in print: a long-drawn series of wild, harsh whistles that could be heard half a mile away." Laun (1957) refers to a "series of short chattering-like sounds phonetically expressed as a loud whispered chit-chit . . ." and he noted that this call was given in several contexts.

The Squeal Call is not described in the literature, but it is associated with injury-feigning behavior. Many birds, including shorebirds, perform injury-feigning displays, and presumably these displays serve to draw potential predators away from the nest or brood (Armstrong, 1952; Duffy et al., 1950; Simmons, 1951; Williamson, 1948). The Squeal Call may well have evolved to reinforce injury-feigning, presumably helping to direct the attention of a potential predator toward the displaying bird. The similarity of the Squeal Call to the distress call of a small mammal may not be due to chance; Duffy et al. (op. cit.) speculate that one predominant form of injury-feigning, the "rodent run," owes its biological success to its semblance of a small mammal running away. Interestingly, a call is also given during injury-feigning by the Purple Sandpiper (*Calidris maritima*) (Bengston, 1970) and the Spotted Sandpiper (*Actitis macularia*) (Oring and Knudson, 1972).

The Mooing and Chert Calls also appear undescribed in the literature: both obviously have a courtship function. The Chert Call may represent an invitation to copulate, and like the Mooing Call is given almost invariably by the male. The only exception, as already mentioned, was an instance in which a female gave a Mooing Call in response to displaying (Bowling Display) by a male.

In regard to the vocalization of the Mountain Plover with young, Bailey (1928) has reported the experience of J. Stokely Ligon. The latter heard a female with a brood give "a low call," at which the young scattered away from her and the observer. After the observer withdrew to a distance of perhaps 40 feet and into an automobile, "the mother began to quiet the young with the 'notes of ease' and they soon gathered around her." From this account, it would appear that two sets of calls were used, one to scatter the

young (perhaps the Tu-lup or Ke-op Call), and one to attract them (perhaps the Brood Call). As I have mentioned earlier, at 25 m the Brood Call was not audible to me (I have normal hearing), but at 12 to 13 m what appears to have been this call was audible to Ligon. There is the obvious advantage to low audibility in this type of call, in that the young are always near the attending adult, and any extra loudness would accomplish little, other than possibly altering predators to the presence of the young.

The Chick Call appears to be the location and/or distress note of the young and it may well persist until they are several days or even weeks old. This call is probably the equivalent of that in the young in many precocial species, including in Charadriiformes as well as in other orders of birds. The Peeping "Call" might function to synchronize hatching, as in Bobwhite Quail (*Colinus virginianus*) (Vince, 1964), or otherwise serve some chick-parent communication function. Peeping noises in the egg have also been reported for the Killdeer (*Charadrius vociferus*) (Davis, 1943), the Little Ringed Plover (*Charadrius dubius*) (Simmons, 1953), the European Golden Plover (*Pluvialis apricaria*) (Bannerman, 1961), and the Dotterel (*Eudromias morinellus*) (Nethersole-Thompson, 1973).

SUMMARY

Nine calls of the adult Mountain Plover, one chick call, and noises emitted from the egg are described. Tentative interpretations are made regarding the motivation and/or function of some of these calls. Of special interest is the speculation that one call may have evolved to enhance the effectiveness of injury-feigning behavior. A comparison between Mountain Plover vocalizations reported in the literature and those recorded in my study is made.

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